

THE GOVERNOR'S REPORT

On the Potential for Flooding and Drought In Montana

June 2014

The Honorable Governor Steve Bullock

Prepared by

The Montana
Governor's Drought and Water Supply Advisory Committee

www.Climate.mt.gov

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Executive Summary

The *Governor's Report on the Potential for Drought and Flooding in Montana 2014* provides projections of what can be expected for surface water supplies in terms of reservoir storage, streamflow, soil moisture, agricultural production and climatic conditions.

Drought Potential

At this time, the potential for impacts from drought to surface water uses dependent on spring snowmelt runoff from mountain snowpack through July is **low** east and west of the Continental Divide. The potential for impacts from drought to dryland farming and livestock production at this time is **low** to **moderate** east and **low** west of the Continental Divide into July. An El Niño climate event is forming in the Pacific Ocean which could cause warmer and drier conditions for summer. <http://droughtmonitor.unl.edu/Home/RegionalDroughtMonitor.aspx?west>

Flood Potential

The potential for flooding in coming weeks at this time is **moderate** to **high** on both sides of the Continental Divide of the state. As of May 28, several rivers west of the Divide are at flood stage such as the Flathead, Bitterroot and Upper Clark Fork. A number of rivers in the headwaters of the Missouri and Yellowstone river basins are currently experiencing, or are on the brink of, flooding such as the Big Hole River near Melrose, the Boulder River near Big Timber, and Clark's Fork Yellowstone near Belfry. <http://waterwatch.usgs.gov/?m=flood&r=mt&w=real.map>

Mountain Snowpack

Cooler than normal temperatures at high elevations has delayed significant melting of the snowpack until the Memorial Day weekend. At this time a number of NRCS Snotel gauges at locations both west and east of the Divide above 6,500 ft. elev. indicate from 20 to 30 or more inches of water as of May 30. NRCS Snowmelt Peak Streamflow Dates Forecast Table forecasts May 20 to June 3 for peak streamflow west of the Divide and May 25 to June 10 east of the Divide. NOAA's June 4th 8- to 14-day temperature outlook and precipitation forecasts call for a 33- to 50-percent probability of above average temperatures from June 12 to June 18 and normal precipitation for the western two-thirds of the state with a 33- to 40- percent chance of above average precipitation for eastern Montana. <http://www.cpc.ncep.noaa.gov/products/forecasts/>

Flood Reporting

The National Weather Service (NWS) reports that some flooding occurred recently across the north-central and central regions over the course of May. As of May 29, the NWS issued a Flood Warning for the Big Hole River at Melrose and Flood Watch designations for the Gallatin River at Logan and Gallatin Gateway. Numerous other stream gauging locations, especially west of the Continental Divide and in the headwaters of the Yellowstone River were approaching flood stage. The NWS Advanced Hydrologic Prediction Service (AHPS) shows Flood Warnings and the hydrologic outlook by river <http://water.weather.gov/ahps2/hydrograph.php?wfo=tfx&gage=MLRM8>
U.S. Geological Survey Water Watch: <http://waterwatch.usgs.gov/new/?m=flood&r=mt&w=real.map>
For contacting Montana Disaster and Emergency Services, state or county, use this link: <http://montanadma.org/sites/default/files/DES%20COORD%20DIRECTORY%20-%20PUBLIC.pdf>

Snowpack Runoff

According to the Natural Resources and Conservation Service (NRCS) Snow Survey, low elevation mountain snowpack has melted. However, in many mountain ranges of the state mid- to high elevation snowpack remains intact. A warm spell in coming days could prompt flooding from snowmelt runoff posing threats to life and property especially if accompanied by high elevation rains. Otherwise, flooding on the scale experienced in spring 2011 is unlikely. Generally, streamflows are running well above the 1981-2010 average. See:

<http://www.wrh.noaa.gov/tfx/FloodBriefing.php?wfo=txf>

Montana Water Supply and Moisture Condition Status by County map

The May 13, 2014 Montana Water Supply and Moisture Condition Status by County map, indicated that none of the state's 56 counties were rated below average for soil moisture and anticipated water supplies. Madison and Beaverhead counties are in the *Near Average* category leaving the remaining 54 counties ranging from *Slightly Moist* to *Extremely Moist*.

See: <http://docs.msl.mt.gov/geoinfo/CurrentDroughtMap/drtstatus.pdf>

Surface Water Supply Prospects

Of 54 river basins statewide on the May 7, 2014 Surface Water Supply Index (SWSI) Map, only 2 basins (Beaverhead and Mission Valley) are expected to experience shortfalls in water supplies over the course of the water use season at this time. The remaining 52 river basins depicted on the current SWSI Map are expected to have conditions ranging from *Near Average* to *Extremely Wet*. See: http://docs.msl.mt.gov/geoinfo/CurrentSWSI/Current_SWSI.pdf

Soil Moisture Conditions

According to the May 27, 2014 USDA Agricultural Statistics Service Montana Crop Progress Report topsoil moisture was rated 85 percent adequate to surplus compared with last year at this time when it was 73 percent. The five-year average is 83 percent. Subsoil moisture was rated 85 percent adequate to surplus compared with 59 percent last year on this date and the five-year average of 75 percent.

Wildfire Season Outlook

Officials of the Northern Rockies (Wildfire) Coordination Center (NRCC), in Missoula are calling for a normal wildfire season at this time with average precipitation east and slightly drier for the period June-August the 2014 near normal conditions are forecasted at this time:

http://www.predictiveservices.nifc.gov/outlooks/extended_outlook.png

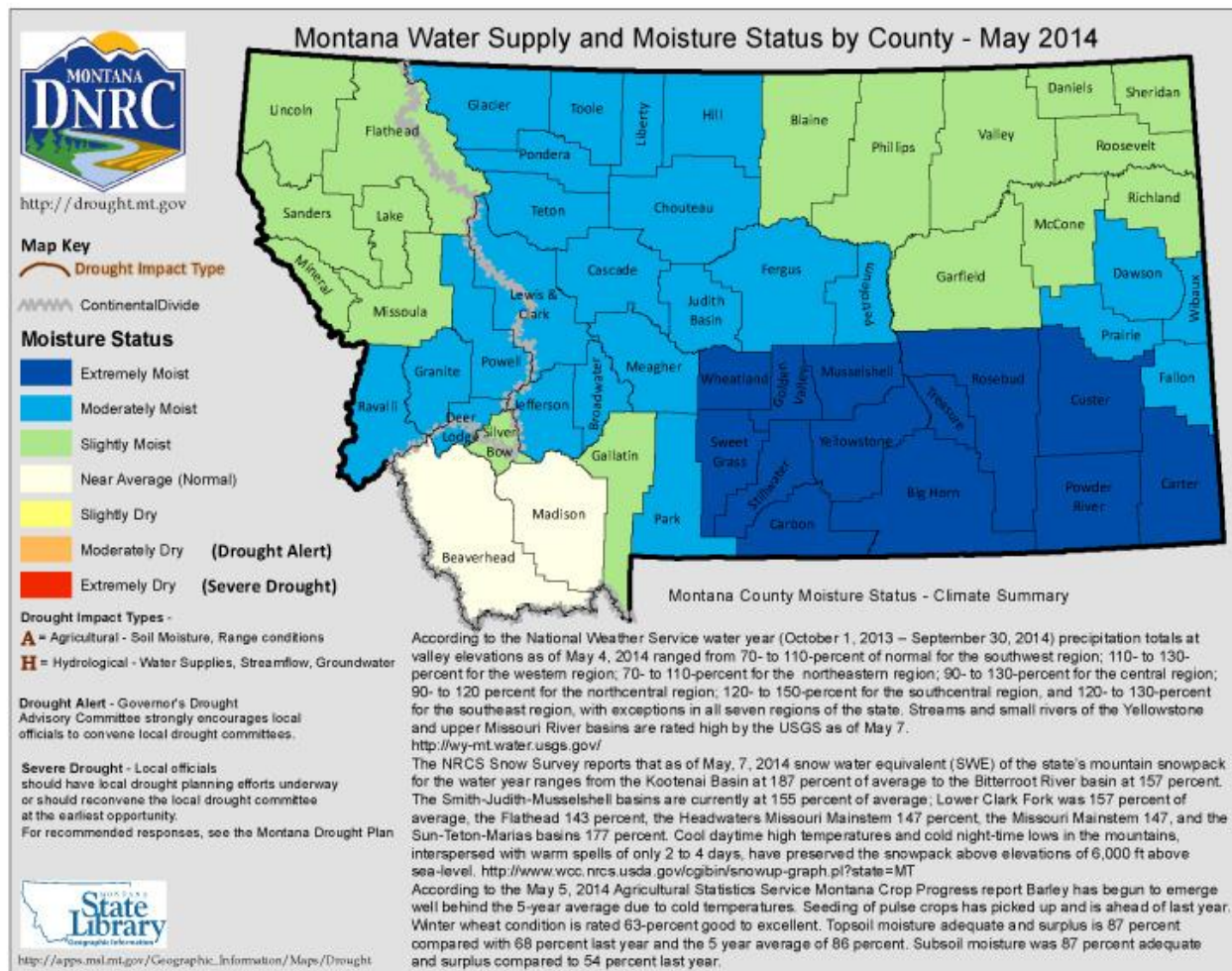
http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=1

It is important to remember that low streamflow, wildfire, and other impacts from dry and warm weather are not uncommon by mid- July through late summer in Montana in any given year. The official Internet site of the *Governor's Drought and Water Supply Advisory Committee* can be found at: www.climate.mt.gov . Presentations from the meetings are posted on the site at "Committee" - "Meeting Information." <http://drought.mt.gov/Committee/Meetings.aspx>

CURRENT WATER SUPPLY AND MOISTURE CONDITIONS

Montana Water Supply and Moisture Status by County

The Montana Governor's Drought and Water Supply Advisory Committee performs a monthly assessment of drought conditions by county on a year-around basis. A technical group of committee scientists assesses conditions for each county using a variety of moisture and water supply data from real-time monitoring high in the mountains to standard valley-elevation gauging systems, as well as field reports from county extension agents, producers, and other government field offices. <http://nris.mt.gov/Drought/status/>
<http://docs.msl.mt.gov/geoinfo/CurrentDroughtMap/drtstatus.pdf>



Precipitation and Temperature

The Great Falls Montana State Office of the National Weather Service presentation before the May 15, 2014 Governor's Drought and Water Supply Advisory Committee is linked here:

http://drought.mt.gov/Committee/Presentations/2014/dnrc_may.pdf

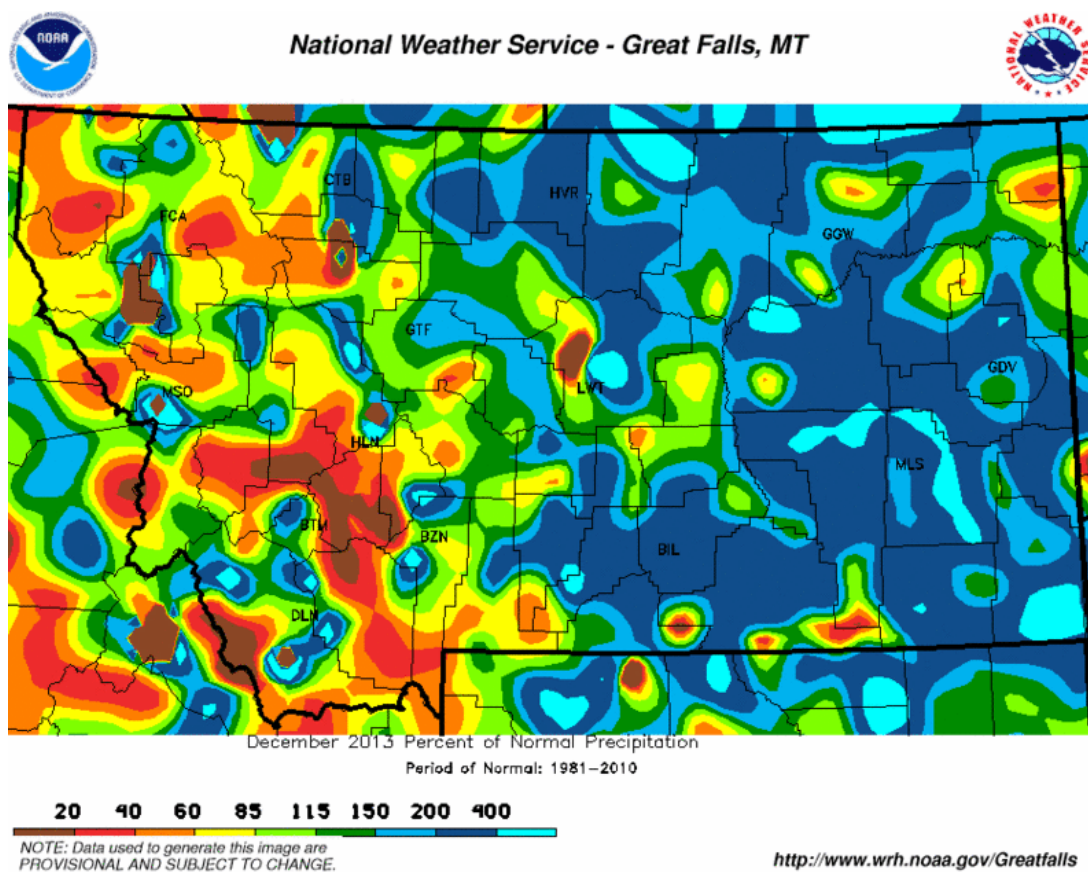
The Weather Service April 2014 Weather/Precipitation Summary:

http://www.wrh.noaa.gov/tfx/climate/droughtsum/pdfs/montanawx_2014_04.pdf

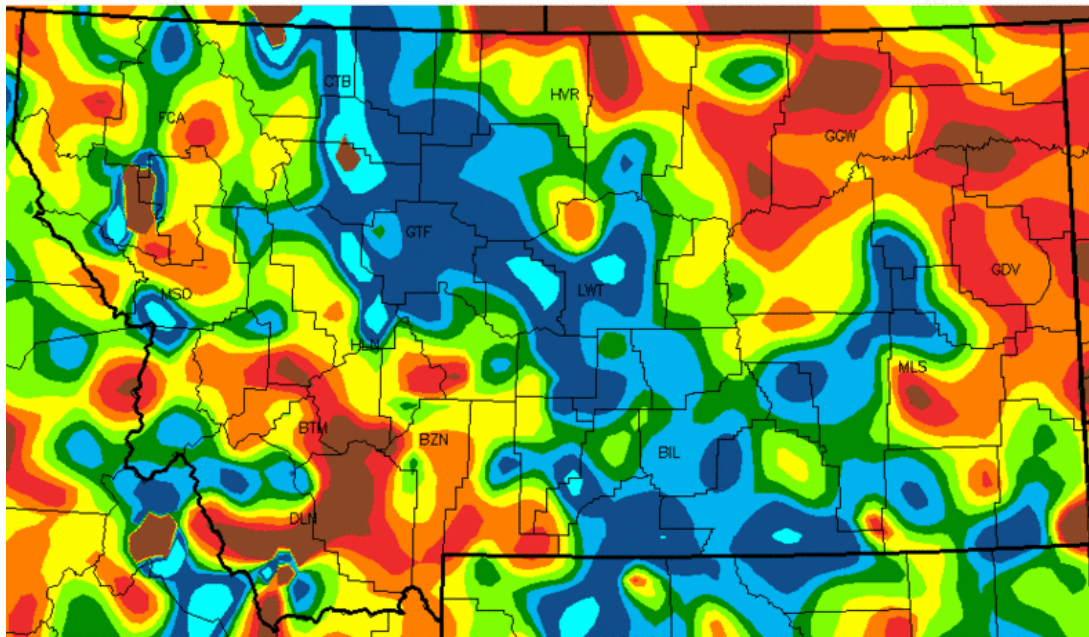
Statewide precipitation totals as of May 27, 2014:

<http://www.wrh.noaa.gov/tfx/dx.php?wfo=tx&type=&loc=products&fx=PCPNTOTALS>

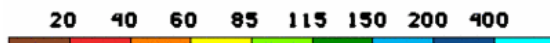
The following maps of over 300 observation locations show precipitation for various time periods.



December 2013 precipitation for Montana was well above average with the largest amounts across the eastern one-half of the state. The remainder of the state ranged from 40- to 85-percent of average.



Jan 2014 Percent of Normal Precipitation
Period of Normal: 1981–2010



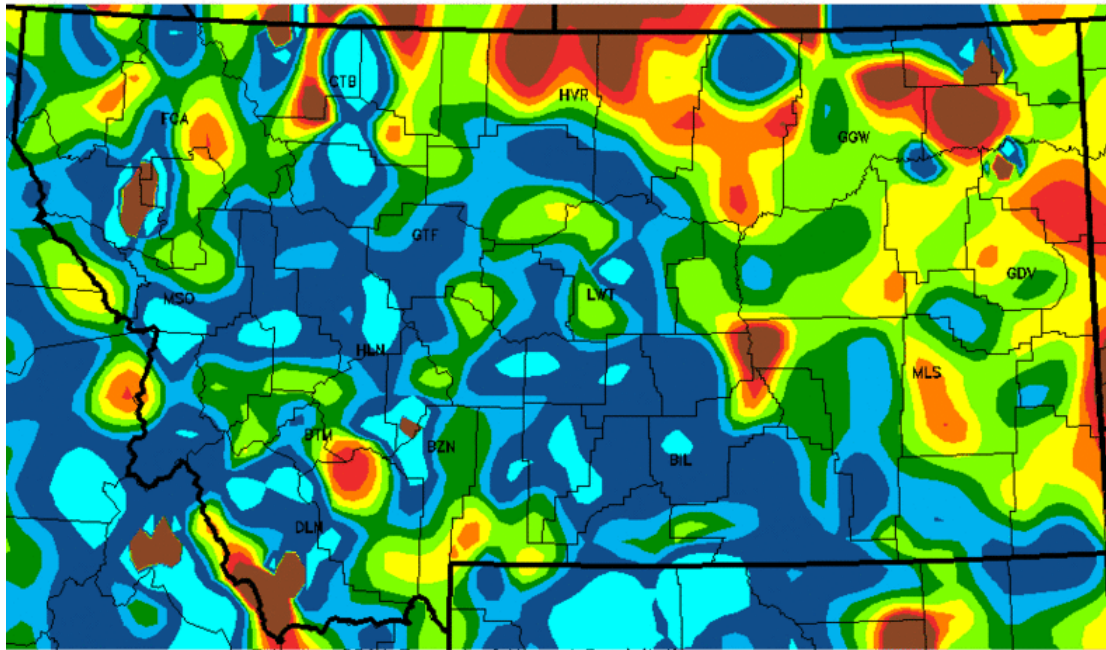
NOTE: Data used to generate this image are
PROVISIONAL AND SUBJECT TO CHANGE.

<http://www.wrh.noaa.gov/Greatfalls>

January precipitation ranged from 50- to 200-percent of average across the state with the state's Golden Triangle grain-producing region and the southcentral region of the state receiving from 115- to over 200-percent of average.



National Weather Service - Great Falls, MT



February 2014 Percent of Normal Precipitation
Period of Normal: 1981-2010

20 40 60 85 115 150 200 400

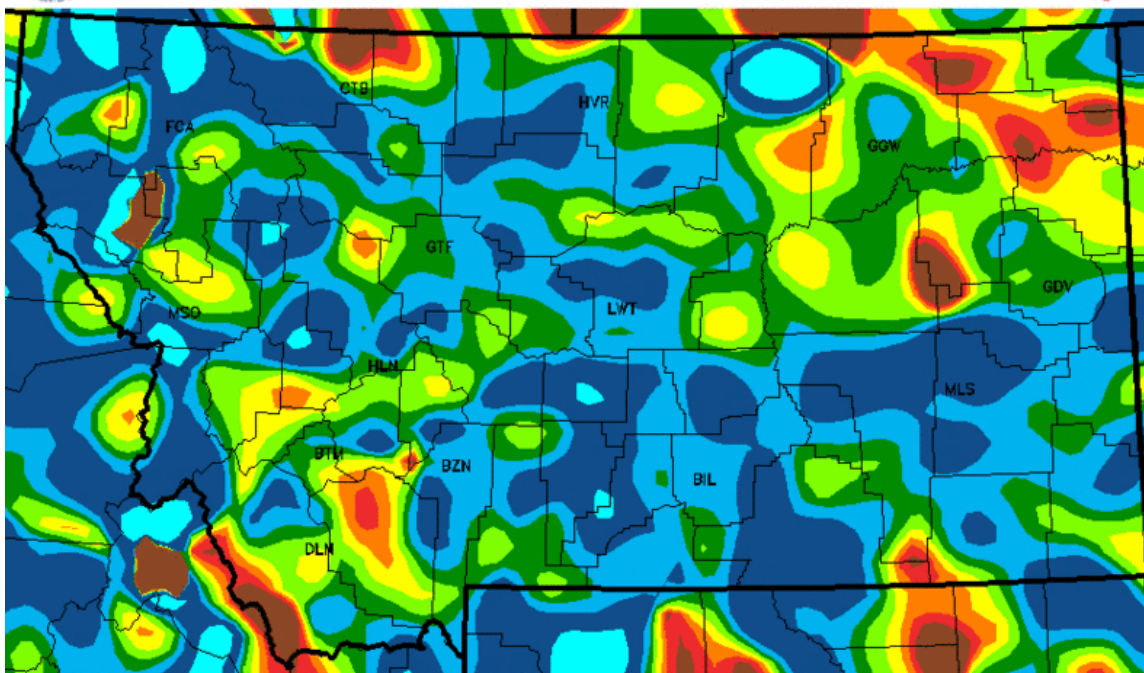
NOTE: Data used to generate this image are
PROVISIONAL AND SUBJECT TO CHANGE.

<http://www.wrh.noaa.gov/Greatfalls>

The month of February usually brings about one half to one inch of precipitation to valley elevations over most of the state according to the Montana Climate Atlas (Caprio & Nielsen 1992).



National Weather Service - Great Falls, MT



March 2014 Percent of Normal Precipitation
Period of Normal: 1981–2010

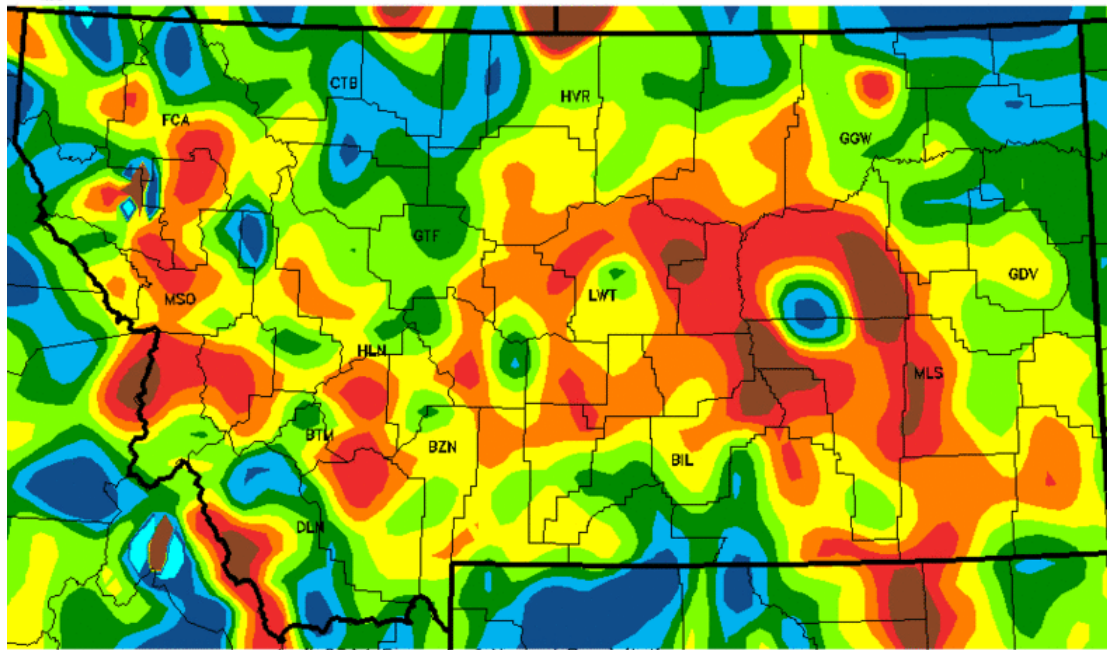


<http://www.wrh.noaa.gov/Greatfalls>

“In March a notable percentage increase in precipitation takes place east of the Continental Divide especially in southern and southwestern locations.”
Montana Climate Atlas (Caprio & Nielsen 1992)



National Weather Service - Great Falls, MT



April 2014 Percent of Normal Precipitation

Period of Normal: 1981–2010

20 40 60 85 115 150 200 400

NOTE: Data used to generate this image are
PROVISIONAL AND SUBJECT TO CHANGE.

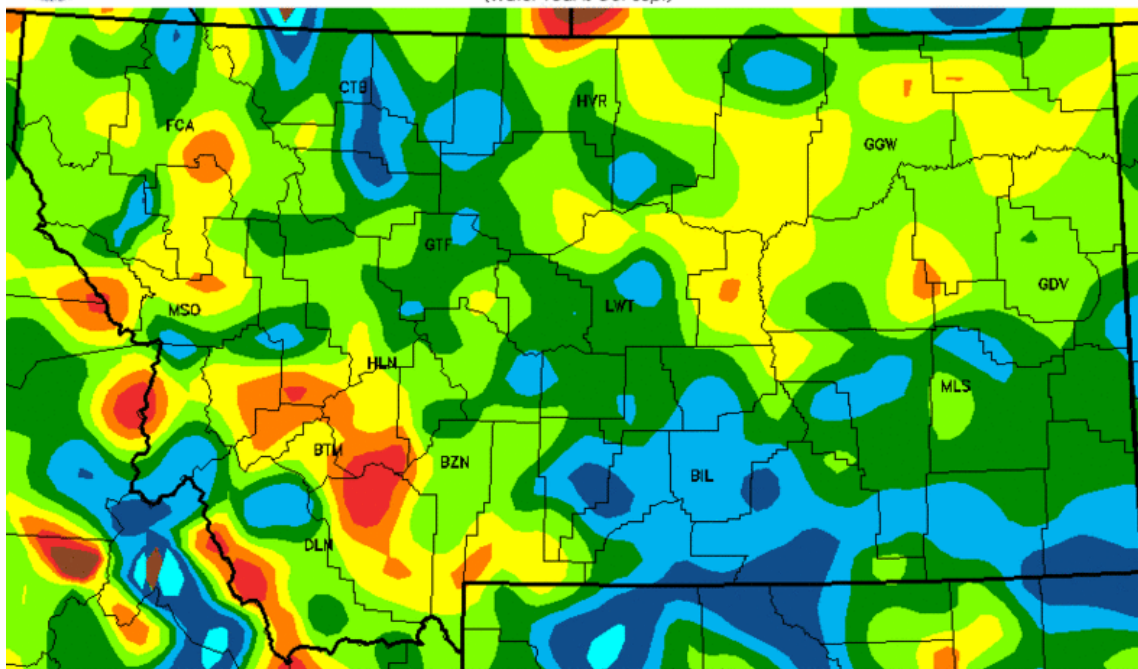
<http://www.wrh.noaa.gov/Greatfalls>

“Precipitation at valley elevations begins to increase in the month of April with the high mountains of the south and in the north near the Continental Divide receiving more than 6 inches. Locations in the Northeast experience a secondary peak of precipitation in late April and early May which are associated with storms that deposit a half inch or more of precipitation. Drought years are notably linked with the failure of these early season storms.”

Montana Climate Atlas (Caprio & Nielsen 1992)



National Weather Service - Great Falls, MT
Montana Precipitation for the Water Year
(Water Year is Oct-Sept)



Oct 2013-Apr 2014 Percent of Normal Precipitation
Period of Normal: 1981-2010



<http://www.wrh.noaa.gov/Greatfalls>

The current Water Year (October 1, 2013 through April 30, 2014) precipitation has ranged from about 80- to 120 percent of average with some small pockets of well below and well above average. With the state's two highest precipitation months, May and June, just ahead we can expect about 2.5 inches of precipitation from each month at valley elevations. Mountain precipitation continues to provide moist conditions at high elevations. Montana Climate Atlas (Caprio & Nielsen 1992)

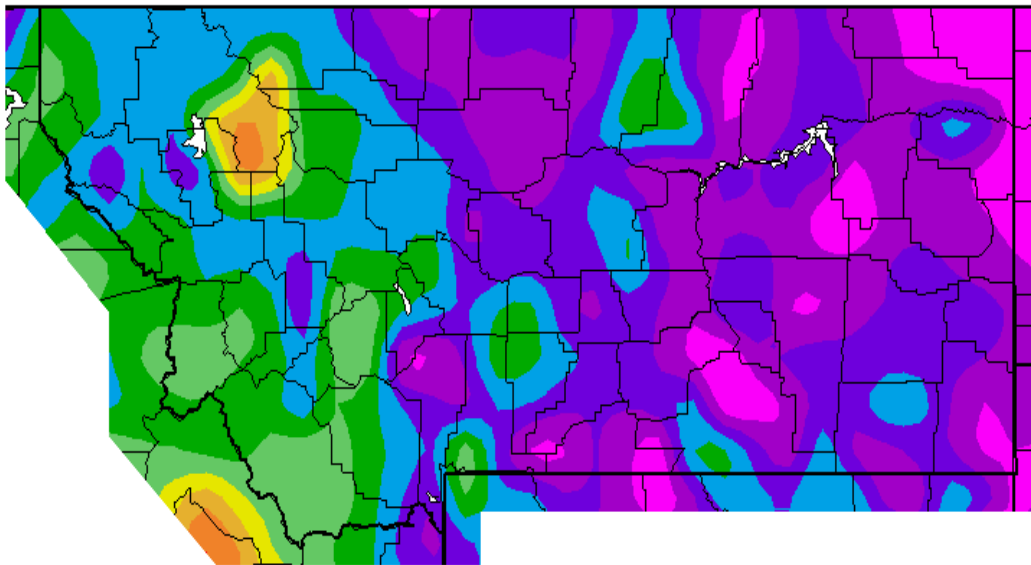
Reporting stations from across the state average from about 90- to 120 percent for precipitation received for Water Year 2014 through May 27. Most of these stations are located at valley elevations <http://www.wrh.noaa.gov/tfx/dx.php?wfo=txf&type=&loc=products&fx=PCPNTOTALS>

According to NRCS, nearly 80-percent of the state's water annual water supply originates as snow in the mountains of the state. As of May 15 a number of high elevation stations of the NRCS Snotel network, received up to 40 or more inches of precipitation (nearly 200 percent of average) thus far for Water Year 2014. As of May 23, numerous Snotel sites above 5,500 ft. elevation continued to hold from 20- to 40 inches of water.

The NOAA Western Regional Climate Center generates temperature and precipitation maps daily showing departures from, and percentages of average. http://www.wrcc.dri.edu/anom/mon_anom.html

Temperature

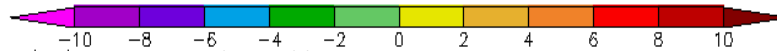
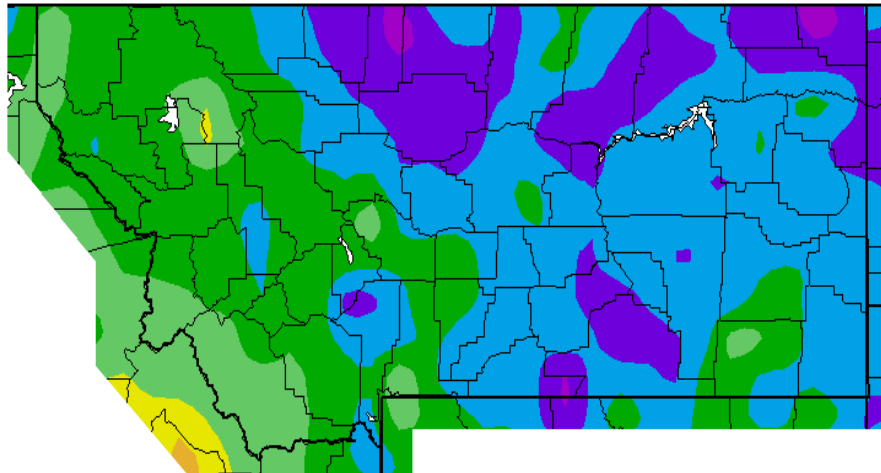
Av. Max. Temperature dep from Ave (deg F)
11/22/2013 – 5/21/2014



Generated 5/22/2014 at WRCC using provisional data.
NOAA Regional Climate Centers

Six-month departure from average temperatures for Montana illustrates the anomalously cold daily high temperatures across the eastern two-thirds of the state over the past 6-months.

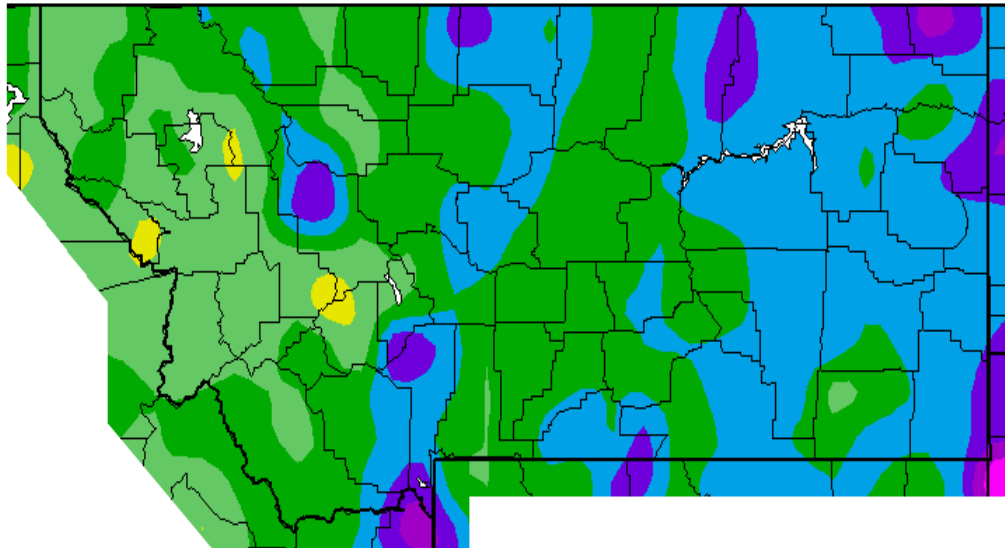
Av. Max. Temperature dep from Ave (deg F)
2/21/2014 – 5/21/2014



Generated 5/22/2014 at WRCC using provisional data.
NOAA Regional Climate Centers

Three-month departure from average daily high temperatures for Montana illustrates the continued anomalously cold temperatures across the eastern two-thirds of the state.

Av. Max. Temperature dep from Ave (deg F)
4/22/2014 – 5/21/2014



Generated 5/22/2014 at WRCC using provisional data.
NOAA Regional Climate Centers

One month maximum daily high temperatures ranged from 2- to 7-degrees F. below average for the eastern two-thirds of Montana and 2- to 4-degrees below average for Western Montana.

The National Weather Service (NWS) Great Falls State Office prepares a semi-monthly drought report summarizing weather and precipitation for 21 cities and towns for the month and water year.

See: http://www.wrh.noaa.gov/tfx/climate/droughtsum/pdfs/montanawx_2014_04.pdf

For the NWS May 15th Governor's Drought and Water Supply Advisory Committee meeting Report

See: http://drought.mt.gov/Committee/Presentations/2014/nws_may.pdf

Mountain Precipitation

According to the NRCS, nearly 80 percent of annual streamflow in Montana originates as snowfall that accumulates high in the mountains during fall, winter, and spring. Aquifers, lakes, streams, and reservoirs are largely dependent on runoff from mountain snowpack. As the snowpack accumulates, hydrologists are able to forecast the runoff that occurs when it melts, and in turn, the streamflow expected in the months that follow. NRCS records for the current period of record, 1981-2010 indicate that the peak of snow water equivalent (SWE) of the snowpack occurs around April 15 each year. See: <http://www.mt.nrcs.usda.gov/snow/data/>

According to the NRCS Montana Water Supply Outlook Report as of May 1, 2014, "April did not provide the well above average snowfall and precipitation experienced during the months February and March, however the weather pattern experienced did help to delay snowmelt and build on the high percentages of normal. Most basins in the state exhibited peak snow water equivalent during the beginning and middle part of April, while some basins in southwest Montana and along the Continental Divide exhibited peaks at the end of the month. While some snowmelt has occurred at lower to mid elevations, higher elevations in the basins have seen little melt during the month, delaying the onset of the bulk of the snow-melt runoff from entering river systems."

Snowpack

According to the NRCS, statewide SNOTEL and snow course data reported 155 percent of normal for May 1st, and 149 percent of last year at this time. The Bitterroot River Basin currently had the highest basin percentage of normal in the state, indicating 188 percent of normal for May 1st, and 199 percent of last year at this time. Worth noting this month, are the Missouri Mainstem, Tongue, and Powder River basins which reported the highest daily snow water equivalent values (SWE) since 1981. However, the 2014 peak SWE did not surpass those recorded 1997 and 2011.

If snowmelt continues to be delayed in the mountains the basin percentages of normal will continue to increase, as snowmelt is normally occurring at this time. According to the NRCS, "This time of year the daily normal value that we compare current SWE values to is decreasing as it generally represents a melting snowpack. If the current snow water equivalent value stays the same, or decrease at a slower rate, the basin percentages of normal will increase. Since the peak may have been observed in many of the basins, the basin percentages are indicating that there is a substantial amount of snow water left in the mountains compared to normal for runoff this spring."

The larger and deeper the mountain snowpack is, the more insulation it provides for the snowpack beneath from the deleterious effects of warmer temperatures serving to extend its existence. The anomalously cooler temperatures this water year have also served to preserve the snowpack. However, as the length of daylight hours increases approaching the summer solstice, it becomes hard for even high elevation annual snowpack to withstand the approaching seasonal warming.

NRCS provides an interactive SNOTEL Update Report:

<http://www.wcc.nrcs.usda.gov/reports/SelectUpdateReport.html>

For the May 15th NRCS Snow Survey and Water Supply Report before the Governor's Drought and Water Supply Advisory Committee See:

http://drought.mt.gov/Committee/Presentations/2014/usda-nrcs_may.pdf

The following table summarizes water year mountain precipitation from the NRCS Snotel automated network as of May 21 for the major river basins of the state. The peak of water content of the snowpack occurs historically around April 15. However, snowpack above 5,000 ft. elevation continued to accumulate well past that date in Water Year 2014 as a percent of median.

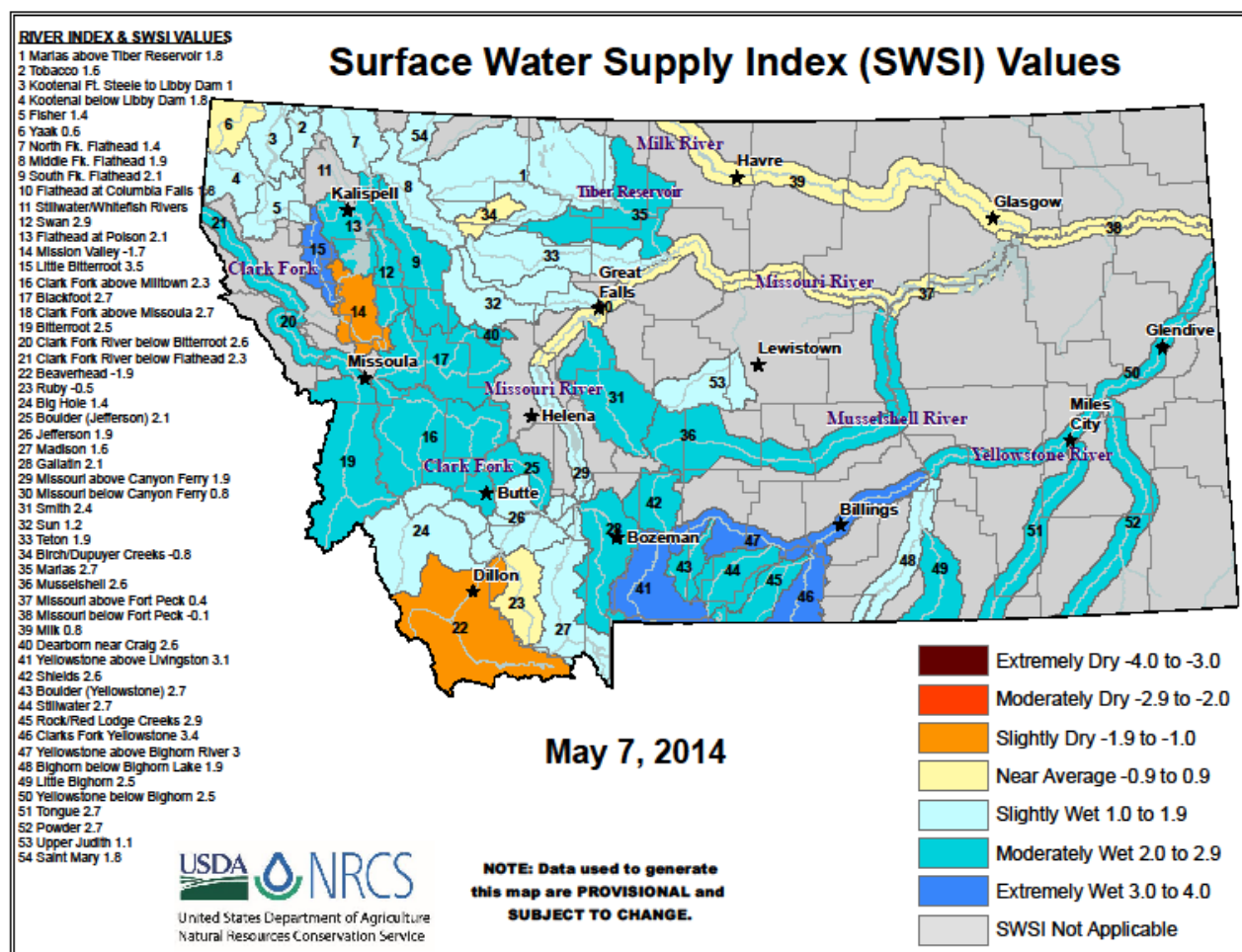
The “Snow Water Equivalent” figures indicate the water content of the snow at the site on that date as a percent of median, whereas the water-year-to-date or “Total Precipitation” figures show what precipitation has occurred since October 1, 2013 at particular Snotel sites whether or not it remains (as snow) at the site.

Table 1. Remaining Water Content of Mountain Snowpack in Montana and Water Year-to-Date Precipitation ⁽¹⁾ Period of Record 1981-2010		
Based on Mountain Data from NRCS SNOTEL Sites As of Wednesday, May 21, 2014		
Basin	Water Year Snow Water Equivalents (% of median)	Water Year-to-Date Precipitation (% of average)
Kootenai River	142	102
Flathead River	140	111
Upper Clark Fork River	174	111
Bitterroot River	215	120
Lower Clark Fork River	201	111
Jefferson River	145	108
Madison River	141	110
Gallatin River	197	124
Missouri River Headwaters	154	111
Headwaters Missouri Mainstem	157	120
Smith, Judith, & Musselshell	169	111
Sun, Teton, & Marias Rivers	217	110
Missouri Lower	188	112
St. Mary & Milk Rivers	135	105
Upper Yellowstone	161	127
Big Horn	172	121
Tongue River	211	116
Powder	223	119
Lower Yellowstone	175	115

Surface Water Supply Index

The NRCS generates the Surface Water Supply Index (SWSI) as a projection of surface water availability for 54 Montana river basins based on mountain snowpack, mountain precipitation, streamflow, soil moisture, and reservoir storage. The SWSI is best applied to valley areas with surface water supplies that are dependent primarily upon spring runoff from high elevation mountain snowpack. As of May 7, 2014, the surface water supply outlook for 54 river basins ranged from *Slightly Dry* to *Extremely Wet*.

Link to SWSI map archive: <http://nris.mt.gov/NRCS/swsi/Monthly.asp>



Reservoir Storage

Reservoir storage statewide currently is very good, in part due to good carryover storage from water year 2013. The U.S. Bureau of Reclamation reports that as of May 9, 2014 its projects for the most part contain from 80-percent to 140 percent of average contents.

09-May-14 10:45 AM

BUREAU OF RECLAMATION
MONTANA AREA OFFICE
RESERVOIR OPERATIONS REPORT
09-May-2014
ALL CONTENTS IN ACRE-FEET

RESERVOIR NAME	NORMAL FULL POOL	TOTAL CAPACITY	AVERAGE CAPACITY	RESERVOIR CONDITIONS						WATER SUPPLY OUTLOOK							
				ELEVATION (FEET)		CAPACITY (ACRE-FEET)		2014			MTN. SNOW WATER CONTENT (INCHES)				MAY-JULY RUNOFF MAY 1st FORECAST		
				2013	2014	2013	2014	% FULL	% OF AVG	% OF Last Yr	2013	2014	AVG	% OF AVG	(KAF)	AVG	% OF AVG
CLARK CANYON	5546.10	174,368	135,417	5538.38	5531.86	136,304	107,917	62	80	79	8.20	12.10	12.00	101	45	73	62
CANYON FERRY	3797.00	1,891,888	1,457,426	3781.55	3779.04	1,403,611	1,331,875	70	91	95	11.79	18.26	14.77	124	1,820	1,425	128
GIBSON	4724.00	98,687	63,532	4676.14	4652.27	44,858	26,840	27	42	60	11.86	20.54	12.78	161	473	359	132
PISHKUN	4370.00	46,694	41,840	4367.61	4369.62	43,127	46,117	99	110	107	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
WILLOW CREEK	4142.00	31,848	26,388	4139.68	4140.49	28,517	29,666	93	112	104	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
LAKE ELWELL	2993.00	925,649	736,554	2984.18	2983.67	779,631	772,127	83	105	99	13.98	23.08	14.48	159	330	310	107
SHERBURNE	4788.00	66,147	19,633	4765.64	4768.59	33,404	36,974	56	188	111	23.40	32.80	22.65	145	96	88	106
FRESNO	2575.00	91,746	66,137	2575.42	2575.18	94,950	92,678	101	140	98	0.00	0.00	0.50	0	43	45	96
NELSON	2221.60	78,951	61,792	2221.30	2221.45	77,659	78,302	99	127	101	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
BIGHORN LAKE	3640.00	1,020,573	748,840	3625.57	3603.36	872,771	727,524	71	97	83	11.31	15.07	11.97	126	1,636	923	177

RESERVOIR NAME	Inflow		Elevation Change		Storage Change		Feet to Fill	River Discharge									
	Current	% of Avg	Last Week	Last Year	Last Week	Last Year											
CLARK CANYON	90	35	0.04	-6.52	162	-28,387	14.24		111								
CANYON FERRY	9,987	167	0.40	-2.51	11,165	-71,736	17.96		8,236								
GIBSON	1,615	92	4.85	-23.87	3,064	-18,018	71.73		2,851								
PISHKUN	-16	N.A.	-0.10	2.01	-152	2,990	0.38		0								
WILLOW CREEK	15	N.A.	0.17	0.81	243	1,149	1.51		0								
LAKE ELWELL	1,810	120	0.75	-0.51	10,933	-7,504	9.33		1,073								
SHERBURNE	258	69	-1.41	2.95	-1,762	3,570	19.41		446								
FRESNO	304	49	0.36	-0.24	1,858	-2,272	-0.18		278								
NELSON	275	N.A.	0.46	0.15	1,962	643	0.15		166								
BIGHORN LAKE	8,690	253	-0.04	-22.21	-211	-145,247	36.64		7,515								

DNRC's State Water Projects May 15, 2014 reservoir contents report before the Governor's Drought and Water Supply Advisory Committee is here:

http://drought.mt.gov/Committee/Presentations/2014/dnrc_may.pdf

As of April 30, 2014 17 of 23 State of Montana owned water storage projects had contents ranging from about 80- to 130 percent of average with a few exceptions.

Streamflow

USGS Water Watch shows real-time streamflow and statistics by waving the mouse over a station.

<http://waterwatch.usgs.gov/?m=real&r=mt>

The May 15 presentation by USGS before the Governor's Committee can be seen here:

http://drought.mt.gov/Committee/Presentations/2014/usgs_may.pdf

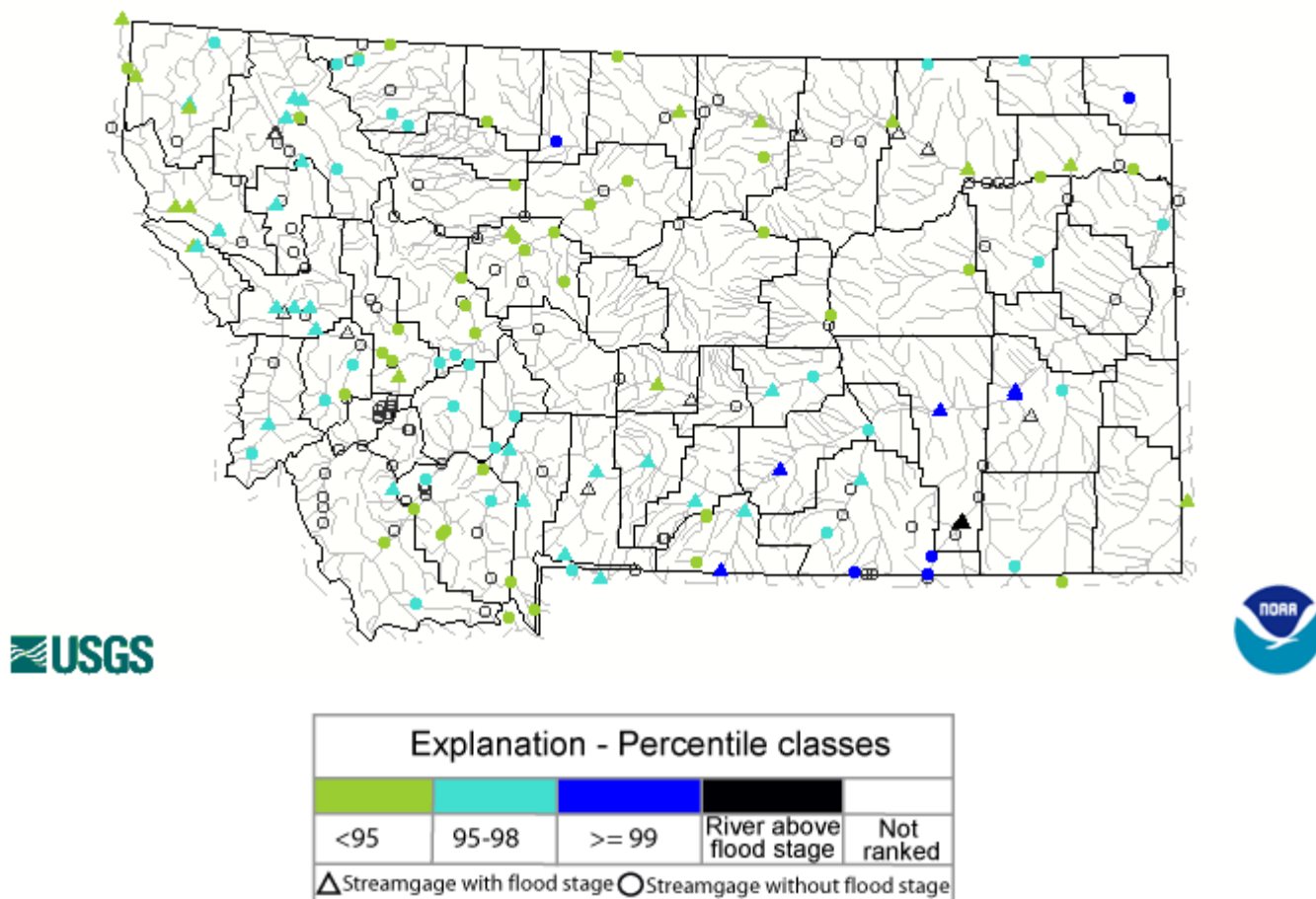
The U.S. Geological Survey Water Watch interactive current streamflow conditions can be accessed here: http://waterwatch.usgs.gov/new/?m=flood&r=mt&w=real_map

Current Conditions for Montana: Streamflow – 221 gaging sites (real-time):

<http://waterdata.usgs.gov/mt/nwis/current/?type=flow>

Map of Flood and high Flow Condition (Montana)

Wednesday, June 04, 2014 12:00ET

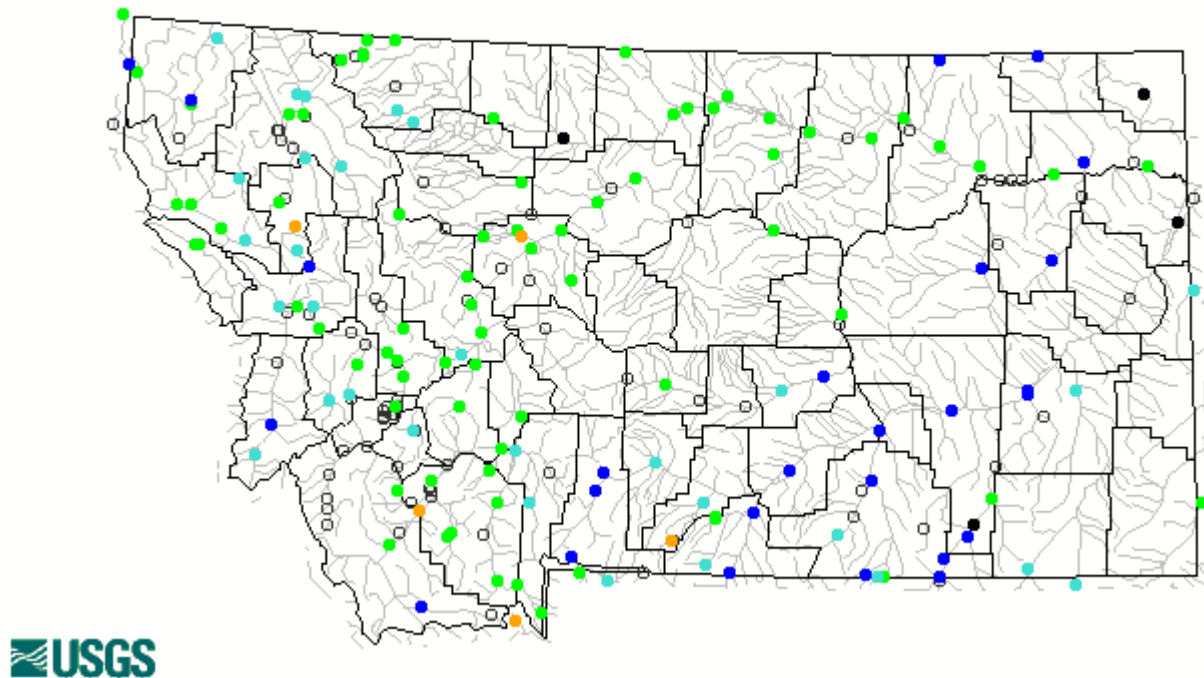


Move your mouse to any location on this map to view current conditions:

<http://waterwatch.usgs.gov/?m=flood&r=mt&w=real,map>

[Map](http://waterwatch.usgs.gov/index.php?m=real&r=mt&w=map) of real-time streamflow compared to historical streamflow for the day of the year (Montana)
<http://waterwatch.usgs.gov/index.php?m=real&r=mt&w=map>

Wednesday, June 04, 2014 12:00ET



Wave your cursor over any point and get station data on line:
<http://waterwatch.usgs.gov/index.php?m=real&r=mt&w=map>

Explanation - Percentile classes							
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked

Streamflow Forecasts

http://drought.mt.gov/Committee/Presentations/2014/usda-nrcs_may.pdf

The NRCS develops streamflow forecasts based upon snowpack water content as spring approaches each year. This year NRCS has an Extremely Above Average flows May-July 2014 listing which includes the Smith-Judith-Musselshell basins projected to be 182-percent of average; the Musselshell River at Harlowton 196-percent; the Musselshell near Roundup 243-percent; the Upper Clark Fork River Basin 160 percent; Lower Willow Creek Reservoir inflow 188-percent; Nevada Creek near Helmville 227-percent; Bitterroot River Basin 158-percent, and West Fork Bitterroot River near Conner 170-percent. According to Montana NRCS, mountain snowpack melt timing is pretty close to a normal rate for this time of year, although it was delayed slightly in April.

In Summary according to NRCS Snow, Water and Climate Services:

- Warm & Sunny weather followed by periods of cooler cloudier (and some snow) has been ideal in compartmentalizing snowmelt to certain elevations;
- Given the volume of snow water equivalent we accumulated this winter, this pattern has been the best case scenario;
- Basin percentages of normal are now relating to a “normally” melting snowpack. Significantly above percentages indicate the above normal winter snowfall and delayed/slow basin melt rates;
- Streamflow response to significant snowmelt has been limited until after the early part of May. Low to Mid-elevation melt has driven the flows we have experienced. Higher elevations are yet to come, and
- May-July streamflow forecasts indicate well above average stream flows for the period. Most basins range from 115- to 160-percent of average and significantly higher. Consult the May 1st Water Supply Outlook Report for more detailed information. The NRCS Peak Streamflow Forecast Table is here:

See: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/mt/snow/?cid=nrcs144p2_057801

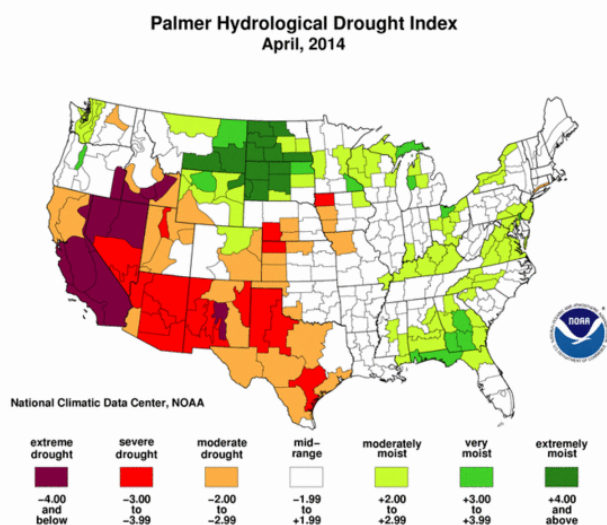
USGS Water Watch: <http://waterwatch.usgs.gov/?m=real&r=mt>

USGS Flood Watch: <http://wy-mt.water.usgs.gov/floodwatch/index.html>

NWS - Advanced Hydrologic Prediction System for flooding information:
<http://water.weather.gov/ahps/>

Palmer Drought Hydrological Index (PDHI)

The PHDI is a composite index generated by NOAA and used as a broad assessment of hydrological conditions: <http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/phdiimage.html>

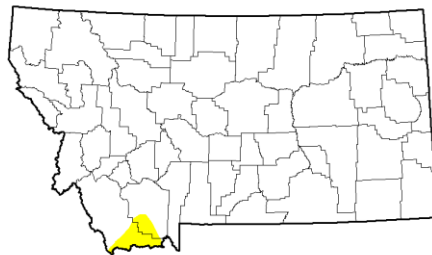


U.S. Drought Monitor <http://droughtmonitor.unl.edu/>

The Drought Monitor map is a widely used cooperative weekly assessment product that describes the degree, type, and extent of conditions across the nation. See: <http://droughtmonitor.unl.edu/>

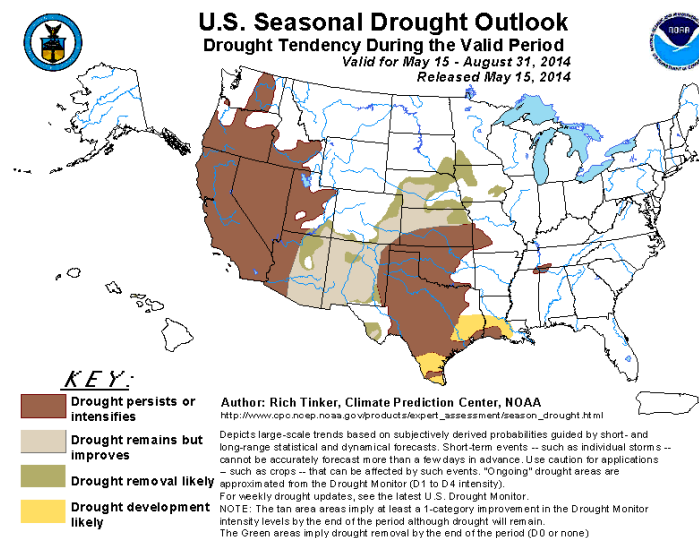
As of May 20, 2014, the U.S. Drought Monitor showed only one small area of the state as “Abnormally Dry” or D-0, located in extreme southwestern Montana in Beaverhead and Madison counties in the headwaters of the Missouri River Basin. Low storage in Clark Canyon and Lima reservoirs, along with poor soil moisture, were the reasons for the Abnormally Dry classification.

<http://droughtmonitor.unl.edu/AboutUs/ClassificationScheme.aspx>



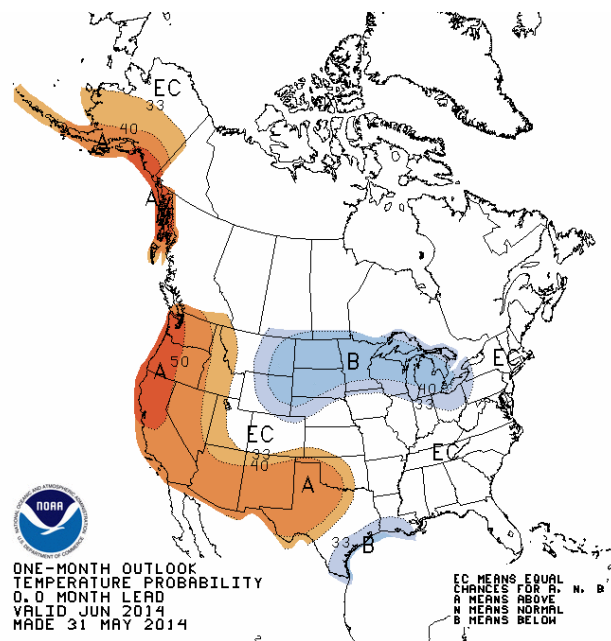
U.S. Seasonal Drought Outlook

The U.S. Drought Monitor seasonal drought outlook for the period of May 15, 2014 indicates that the potential for drought conditions is unlikely for the state through August 31 with the exception of the remote southwestern region of the state where dry conditions at valley elevations have persisted with limited relief since early 2012.

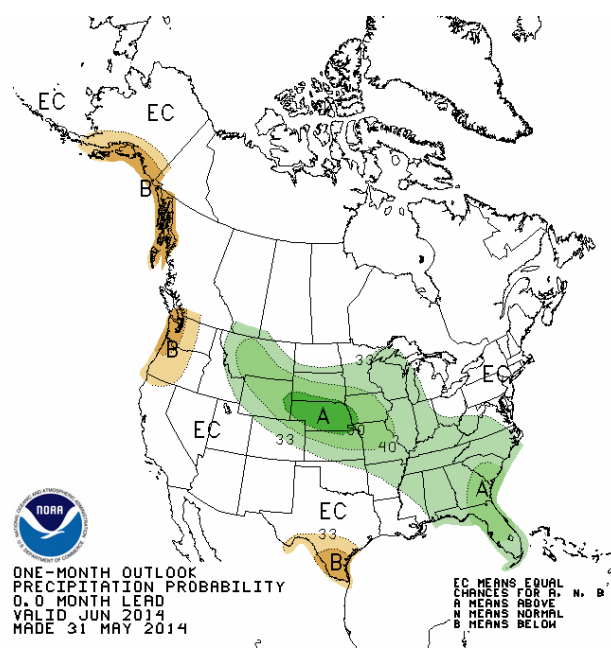


Climate Forecasts

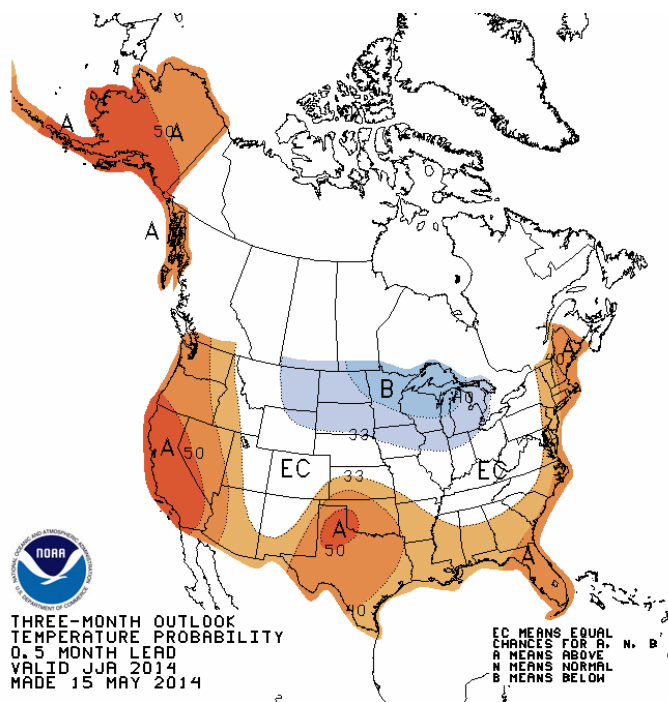
NOAA's Climate Prediction Center (CPC) May 31 one-month climate outlook for June 2014 calls for equal chances of above, normal, or below average temperatures for Montana west of the Continental Divide with a 40- to 50-percent chance of lower than normal temperatures east of the Divide.



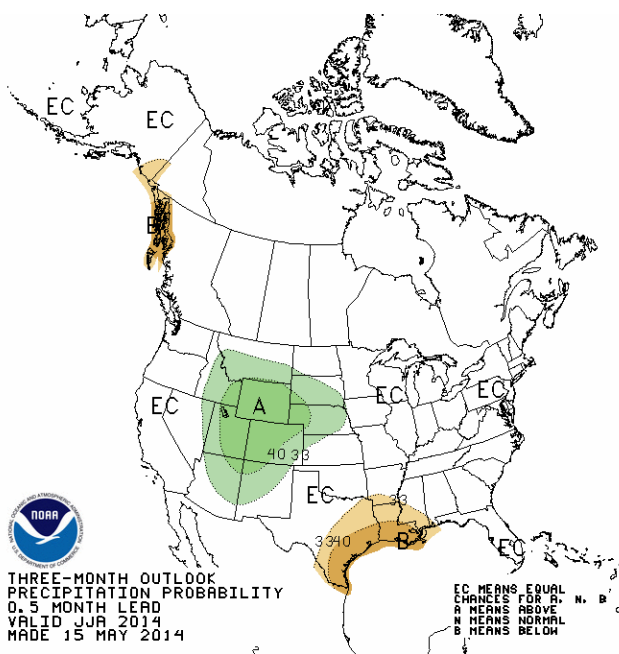
The CPC May 31 one-month outlook for June 2014 calls for equal chances of above, normal, or below average precipitation for the Northeastern corner of the state, a 33- to 40-percent probability of above average precipitation across the central region of the state, and a 33 - to 40-percent chance of above average precipitation west of the Continental Divide and in southwestern Montana



The CPC May 15 Three-month Outlook for June-July-August calls for a 33- to 40-percent probability for cooler temperatures for Eastern Montana. The remainder of the state has equal chances of above, below or near normal temperatures.



The CPC May 15 Three-month outlook calls for a 33- to 40-percent probability of wetter than normal conditions for the southern one-half of the state for the period of June-July-August.



Crop Weather and Progress Reports

According to the May 27, 2014 USDA Agricultural Statistics Service Montana Crop Progress Report Spring and Durum wheat emergence has begun with 58 and 29 percent emerged respectively. Winter Wheat condition remains well above last year with 68 percent Good and Excellent and is in line with the five-year average of 61 percent in good to excellent condition. Lentils are 92 percent planted and 30 percent emerged.

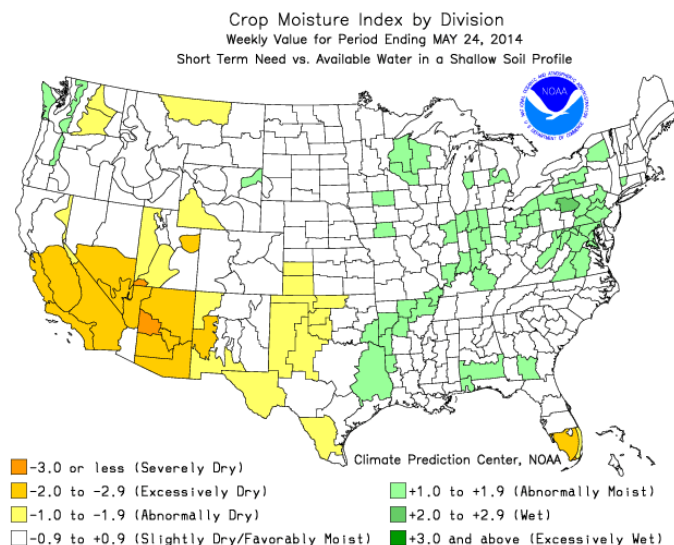
Spring grazing conditions are 70 percent open below last year's 86 percent and the five-year average of 91 percent. Range and pasture conditions remain well above last year and just below the 5 year average with 48 percent good to excellent. Livestock birthing is wrapping up behind last year and the 5 year average with 94 percent calving completed and 90 percent lambing completed. Reporters are noting the need to reseed winter killed winter wheat and hail damaged sugar beets in some areas. Vegetation stress index can be seen here: <http://vegdril.unl.edu/>

Soil Moisture

According to the May 27, 2014 USDA Agricultural Statistics Service Montana Crop Progress Report topsoil moisture was rated 85 percent adequate to surplus compared with last year at this time when it was 73 percent. The five-year average is 83 percent. Subsoil moisture was rated 85 percent adequate to surplus compared with 59 percent last year on this date and the five-year average of 75 percent.

NRCS Soil Climate Analysis Network (SCAN) graphs can be seen here: The May 15 NRCS report: http://drought.mt.gov/Committee/Presentations/2014/usda-nrcs_may.pdf

Crop Moisture Index



Climatology

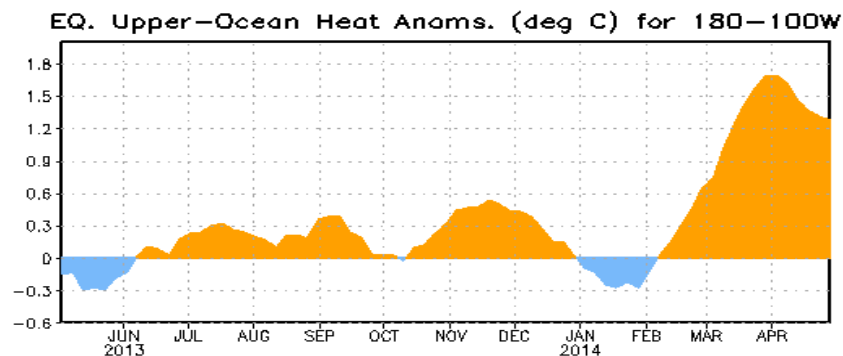
El Niño / Southern Oscillation (ENSO)

The positive (El Niño) and negative (La Niña) phases of ENSO have fairly predictable effects upon Montana usually bringing drier and warmer winters during El Ninos and wetter and cooler winters during La Ninas. The impacts each phase creates during winter, such as high or low water content of mountain snowpack, have significant influence on water supply and soil moisture for the following crop season. The CPC's May 8, 2014 discussion states: Synopsis: Chance of El Niño increases during the remainder of the year, exceeding 65% during summer.

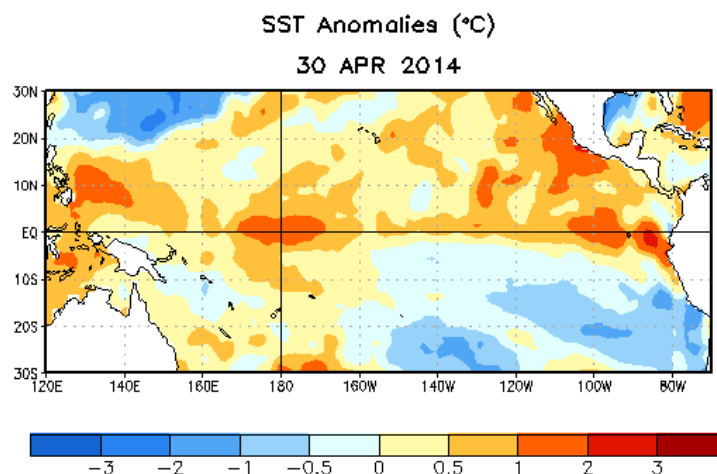
ENSO-neutral continued during April 2014, but with above-average sea surface temperatures (SST) developing over much of the eastern tropical Pacific as well as persisting near the International Date Line it is in an "El Niño-Watch" status at this time: <http://www.climate.gov/news-features/featured-images/slow-slosh-warm-water-across-pacific-hints-el-ni%C3%B1o-brewing>

The May 8, 2014 CLIMATE PREDICTION CENTER/NCEP/NWS and the International Research Institute for Climate and Society El Niño / Southern Oscillation (ENSO) Outlook is calling for an Alert System Status: El Niño Watch.

The May 8, 2014 ENSO Outlook from NOAA's Climate Prediction Center:
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.pdf



Anomalously warm sea surface temperatures (SST's) of the equatorial Niño 3.4 region (5°N-5°S, 120°W- 170°W) pooling in part due to weak equatorial low level easterly winds.



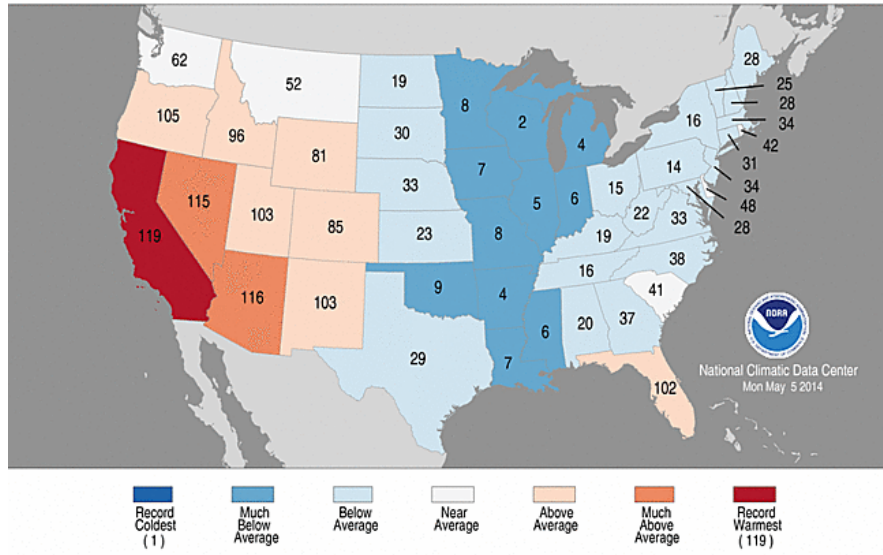
National Temperature and Precipitation Maps

Montana had its 52nd warmest for the 118-year record

Statewide Temperature Ranks

November 2013–April 2014

Period: 1895–2014

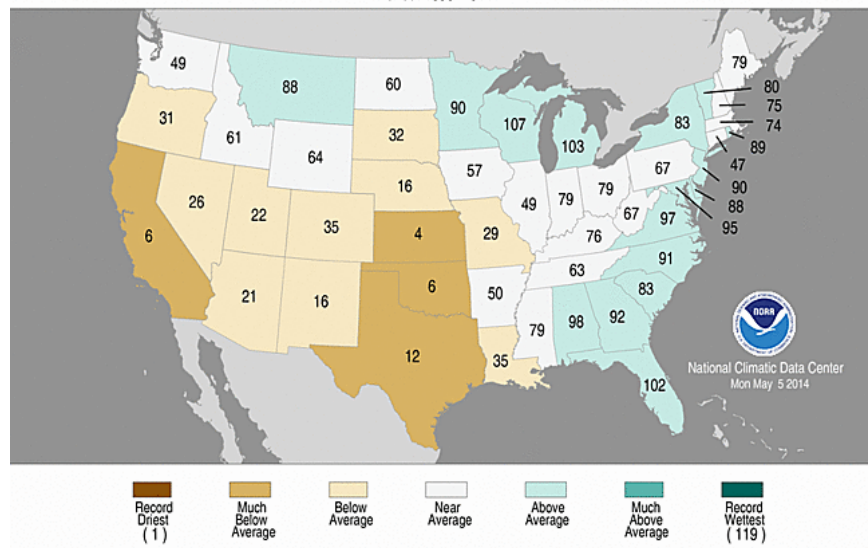


Six-month Precipitation
Montana had its 88th wettest in 118-year record

Statewide Precipitation Ranks

November 2013–April 2014

Period: 1895–2014



Wildfire Season

The Northern Rockies Coordination Center calls for a return to fire normal conditions in August:
http://www.predictiveservices.nifc.gov/outlooks/month2_outlook.png
http://www.predictiveservices.nifc.gov/outlooks/extended_outlook.png

See: April 30, 2014 presentations before the Clark Fork Task Force:
http://www.dnrc.mt.gov/wrd/water_mgmt/clarkforkbasin_taskforce/meeting_presentations/fire_season_2014.pdf and:
http://www.dnrc.mt.gov/wrd/water_mgmt/clarkforkbasin_taskforce/meeting_presentations/nrcc_update_gemmell.pdf

CONCLUSION

At this time, the Montana Governor's Drought and Water Supply Advisory Committee rates the potential for drought-like conditions through the month of July 2014 as **low** for surface water dependent uses east and west of the Continental Divide. East of the Divide there is a **low to moderate** chance that dryland farming could be impacted if average precipitation is not received at valley and plains elevations over the course of June, July, and August.

RESPONSES TO WATER SUPPLY AND MOISTURE CONDITIONS

Over the course of winter and early spring, the committee's member agencies have focused on dissemination of information regarding the potential for flooding in Water Year 2014. Counties at risk for flooding are being closely monitored by the National Weather Service, the USGS through its streamflow gaging network, and Montana Disaster and Emergency Services. **To contact DES:**
<http://montanadma.org/sites/default/files/DES%20COORD%20DIRECTORY%20-%20PUBLIC.pdf>

The National Weather Service (NWS) is hosting a Flood Update Webinar to help county Disaster and Emergency Services county officials be prepared should local streams and rivers approach Flood Stage. Montana Disaster and Emergency (DES) has reported at each of the Governor's Drought and Water Supply Advisory Committee meetings in 2014 to keep Montanans apprised on all official flood-related actions, including FEMA (Federal Emergency Management Agency) actions status for 2014 and actions from 2013 when flooding occurred on the Northern Tier of the state including reservations. The Committee will continue assessing and tracking moisture and water supply conditions for indications of drought emergence.

Internet Site

The Montana State Library's Natural Resources Information System (NRIS) continues to provide support to the Drought and Water Supply Advisory Committee for maintaining important parts of its Internet site, including current links to the NRCS Surface Water Supply Index map suite and archives, the U.S. Drought Monitor and its related products, and the Montana Water Supply and Moisture Status Map by county. See: <http://nris.mt.gov/wis/SWSInteractive/> and <http://drought.mt.gov>

Governor's Drought and Water Supply Advisory Committee Meetings - 2014

The Committee will meet monthly July through October.

See: <http://drought.mt.gov/Committee/Meetings.aspx>

All Power Point presentations from past meetings of the Committee can be found here as well.

MAP FIGURES

Montana Water Supply and Moisture Status by County
May 2014

<http://nris.state.mt.us/Drought/status/>

NRCS Montana Surface Water Supply Index May 7, 2014
<http://nris.mt.gov/Nrcs/swsi/ShowMap.asp?month=Current>

Current Hydrologic Conditions
<http://drought.mt.gov/Links/CurrentConditions.aspx>

CPC Forecasts
<http://www.cpc.ncep.noaa.gov/products/forecasts/>

National Climatic Data Center
<http://www.ncdc.noaa.gov/>

U.S. Drought Monitor Map May 27, 2014
<http://droughtmonitor.unl.edu/> and http://droughtmonitor.unl.edu/DM_state.htm?MT,W

Water Watch, USGS
<http://waterwatch.usgs.gov/new/?m=flood&r=mt&w=real,map>

U.S. Seasonal Drought Outlook Map (CPC) May 15, 2014
http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.html

Palmer Hydrological Drought Index – April 2014
[http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers.php?index=phdi&month\[\]=4&beg_year=2014&end_year=2014&submitted=Submit](http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers.php?index=phdi&month[]=4&beg_year=2014&end_year=2014&submitted=Submit)

Montana Disaster and Emergency Services
<http://montanadma.org/sites/default/files/DES%20COORD%20DIRECTORY%20-%20PUBLIC.pdf>

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